

AMENDMENTS TO THE SPECIFICATION:

Please replace the application title with the following amended title: **“METHOD OF PROVIDING RELIABLE TRANSMISSION QUALITY OF SERVICE IN A COMMUNICATION NETWORK”**.

Please add the following new section heading and paragraph on page 1 after the application title and before the section entitled “Field of the Technology”:

Cross References to Related Applications

This application is the national phase of International Application No. PCT/CN2004/000870, which was filed on July 27, 2004, and which, in turn, claimed the benefit of Chinese Patent Application No. 03143770.2, which was filed August 1, 2003, the entire disclosures of which are hereby incorporated by reference.

Please amend the paragraph beginning on page 3, line 15, as follows:

~~Therefore, an object of the present invention is to provide~~ In accordance with one aspect of the disclosure, a method is useful for providing reliable transmission Quality of Service (QoS) in the communication network, so as to guarantee that effective management upon the whole network resource can be implemented in bearer network and guarantee reliable transmission of important services in the network.

Please amend the paragraph beginning on page 3, line 22, as follows:

~~In order to obtain above object~~ accordance with another aspect of the disclosure, ~~the present invention provides~~ a method for providing reliable transmission QoS in the communication network ~~[[, which comprises]]~~ includes the steps of:

Please add the following new paragraphs immediately before the paragraph beginning on page 3, line 26:

A. creating a QoS connection between bearer network resource managers in the communication network;

B. exchanging and negotiating the QoS information, which the communication network should provide during the data transmission procedure, among the bearer network resource managers through the QoS connection; and

C. according to the QoS information sent by the bearer network resource manager, the connection node connected to this bearer network resource manager providing corresponding resource.

The bearer network resource manager may be located in a bearer control layer of the multiservice network.

Step A may include the following steps for establishing the connection initially:

A1. a local bearer network resource manager that initiates the create connection procedure sending a establish connection request to a peer bearer network resource manager; and

A2. the peer bearer network resource manager responding to the creating connection request and creating the QoS-based connection.

The disclosed method may further include, before step A2, the peer bearer network resource manager judging whether identity of local bearer network resource manager is valid, and if valid, executing step A2, and otherwise, returning a message of unable to create the connection to local bearer network resource manager.

The information carried in the creating connection request may include identification and authentication information of the bearer network resource manager initiating the creating connection request.

The disclosed method may further include the following steps after step A2:

A3. Local bearer network resource manager periodically sending handshake message to peer bearer network resource manager, and determining the connection status according to the handshake response returned by peer bearer network resource manager.

Step A3 may include the following steps:

A31. creating local Keep Active (KA) timer at local bearer network resource manager, and creating peer Keep Active (KA) time at peer bearer network resource manager;

A32. when local KA timer is timeout, local bearer network resource manager adding 1 to timeout times of local KA timer and sending a handshake message to peer bearer network resource manager;

A33. after receiving the handshake message, peer bearer network resource manager restarting peer KA timer and returning a handshake response to local bearer network resource manager; and

A34. local bearer network resource manager determining the created QoS connection status according to timeout times of the local KA timer, peer bearer network resource manager determining the QoS connection status according to whether peer KA timer is timeout.

The information carried in the handshake message may include connection ID and connection resource state information.

Step B may include local bearer network resource manager interacting with peer bearer network resource manager through a plurality of intermediate bearer network resource managers, and the intermediate bearer network resource manager only taking charge in message transfer.

The disclosed method may further include after step B the bearer network resource manager that finally receives the QoS information managing and controlling resources of the connection node under its control according to the received QoS information.

Step B may include the following steps:

B1. local bearer network resource manager sending QoS resource control message that carries the QoS information to the connection nodes under its control as well as to peer bearer network resource manager;

B2. peer bearer network resource manager sending QoS resource control policy to the connection node according to the received QoS resource control message;

B3. after receiving the QoS resource control policy, the connection node returning a response of QoS resource control policy to the peer bearer network resource manager;

B4. peer bearer network resource manager returning a response of the QoS resource control message to local bearer network resource manager.

The QoS resource control message in step B1 may include QoS resource request information, which carries information like connection identification, stream information, QoS parameters and stream descriptor.

The QoS resource control message in step B1 may include a QoS resource release request, which carries information like connection identifier and reason code.

The QoS resource control message in step B1 may include a QoS resource modify request, which carries information like connection identifier and the modified parameter information corresponding to the QoS resource connection.

The QoS resource control message in step B1 may include a connection status inquiry message, and step B4 may include, after receiving the response from the connection node, peer bearer network resource manager checking resource consistency of the created QoS

connection, and returning a response of the connection status inquiry message to local bearer network resource manager according to the check result.

The information carried in the response of connection status inquiry message may include a connection identifier, stream information, QoS parameters, stream descriptor, label stack, path maximum transmission unit, or bearer network resource manager stack, or any combination of the above elements.

The message may further carry information like data consistency information.

The data consistency information may include parameter global path maximum transmission unit, global label stack depth, intra-domain label stack depth and stream description.

The connection node may be a router.

The bearer network resource manager may be a bandwidth broker, a call agent, or a connection manager.

Please amend the paragraph beginning on page 5, line 21, as follows:

~~Key point of the said~~ The disclosed method ~~of the present invention~~ is useful for providing reliable transmission QoS in communication networks ~~is: reliable~~ . Reliable transmission of QoS resource control messages between bearer network resource managers is implemented in communication networks, and each bearer network resource manager provides requested QoS for corresponding services by taking use of the QoS resource control messages, so that corresponding transmission QoS can be reliably provided according to transmission request of the service. First of all, QoS connections between bearer network resource managers should be created in the present invention, and ~~said~~ the QoS connections are used to transfer QoS resource control messages. In addition, resource request and status report between bearer network resource managers are also implemented in the present

invention, which further enhances the reliability of providing corresponding transmission QoS in communication networks.

Please amend the paragraph beginning on page 9, line 9, as follows:

If local bearer network resource manager does not receive the KA message returned by peer bearer network resource manager all along, overtime times of local KA timer will exceed the settled allowable value, and then local bearer network resource manager will release the established QoS connection [[: in]] . In the same way, if peer bearer network resource manager ~~[[des]]~~ does not receive the KA message returned by local bearer network resource manager all along, peer KA timer is time-out, and then peer bearer network resource manager will release the established QoS connection [[: this]] . This added QoS connection maintenance mechanism can effectively guarantee that network resource is reasonably occupied by the established QoS connection.

Please amend the paragraph beginning on page 9, line 25, as follows:

A QoS connection in Online state is established after the processing procedure of step 21 to step 24 [[: wherein this]] . This QoS connection can bear various kinds of QoS resource control messages, while the ~~said~~ QoS resource control messages bear the QoS information for transmitting a certain service in the communication network, and the required QoS information includes the requested bandwidth for a certain service, allowed stream and so on ~~, the specific~~ . One embodiment of the method of the present invention will be further illustrated hereinafter with reference to [[:figure 3:]] Figure 3.

Please amend the paragraph beginning on page 10, line 7, as follows:

Meanwhile, local bearer network resource manager also transmits the determined QoS information to the connection nodes managed by local bearer network resource manager [[, wherein the]] . The connection nodes perform resource control management in terms of this service according to the ~~said~~ QoS information.

Please amend the paragraph beginning on page 10, line 12, as follows:

In the communication network, some important services usually request for the transmission services with high priorities or transmitting some services according to specified bandwidth, etc [[, therefore]] . Therefore, resources of corresponding connection nodes in the bearer network need to be controlled and managed according to specific demands, so as to meet the transmission requirement of corresponding service, namely to control and manage the resources between the start connection node and terminal connection node of the ~~said~~ service.

Please amend the paragraph beginning on page 10, line 29, as follows:

Step 33: after receiving the [[said]] QoS control policy, the connection nodes of peer bearer network resource manager will perform corresponding resource control and management operation, and send a response in allusion to the [[said]] QoS control policy to the [[said]] peer bearer network resource manager.

Please amend the paragraph beginning on page 11, line 1, as follows:

Step 34: after receiving the response in allusion to the [[said]] QoS control policy sent by the underlying connection node and relevant information, peer bearer network resource manager will send a QoS resource control response to local bearer network resource manager, so that local bearer network resource manager can accurately get to know whether the

corresponding QoS resource control message is reliably received, and whether corresponding resource control management operation is performed at corresponding connection node.

Please amend the paragraph beginning on page 11, line 24, as follows:

Information carried by the [[said]] QoS resource request includes:

Please amend the paragraph beginning on page 12, line 12, as follows:

If the messages need to be transferred from local bearer network resource manager to peer bearer network resource manager through multiple intermediate bearer network resource managers, local bearer network resource manager sends the QoS resource request to the next hop intermediate bearer network resource manager first of all [[, the said]] . The intermediate bearer network resource manager performs routing and resource allocation, returns a response towards the QoS resource request to the previous hop intermediate bearer network resource manager or local bearer network resource manager after the resource request is successful and continues to forward the said QoS resource request, until the peer bearer network resource manager receives this QoS resource request, and then the said operation in step 4 is executed.

Please amend the paragraph beginning on page 12, line 32, as follows:

Information carried by the [[said]] QoS resource response includes:

Please amend the paragraph beginning on page 13, line 23, as follows:

After the [[said]] QoS resources are bored and allocated between local bearer network resource manager and peer bearer network resource manager, when the message transfer procedure is ended or the message transfer cannot be normally performed and the procedure has to be ended due to exceptions in the communication network, the process of releasing the

QoS resources has to be performed [[, and the]] . The specific processing procedure is shown in [[figure 5]] Figure 5, [[comprising]] and includes the following steps:

Please amend the paragraph beginning on page 14, line 5, as follows:

The [[said]] QoS resource release request carries information including:

Please amend the paragraph beginning on page 14, line 30, as follows:

After the [[said]] QoS resources are bored and allocated between local bearer network resource manager and peer bearer network resource manager, the allocated QoS resources may ~~needs-modifying~~ need modification according to practical demand of message transfer procedure, like adjusting the allocated bandwidth resources and allowed maximum stream and so on [[, wherein]] . A specific processing procedure of modifying the QoS resources is shown in [[figure]] Figure 6, [[comprising]] and includes the following steps:

Please amend the paragraph beginning on page 15, line 4, as follows:

Step 61: when it is needed to modify the allocated QoS resources, local bearer network resource manager sends a QoS resource modify request to peer bearer network resource manager [[, wherein the]] . The QoS resource modify request carries the to-be-modified QoS resource identifier and the modified QoS resource information and so on [[, meanwhile]] . Meanwhile, local bearer network resource manager needs to send QoS resource modify message, namely stream mapping update message, to the connection nodes under its control and management [[, wherein the said]] . The connection nodes [[performs]] perform corresponding stream mapping update operations according to the received stream mapping update command, so that the QoS resource [[are]] is modified.

Please amend the paragraph beginning on page 15, line 27, as follows:

The ~~[[said]]~~ QoS resource modify request carries information including ~~[[:]~~ parameter global Path Maximum Transmission Unit (PATH MTU), global label stack depth, intra-domain label stack depth, stream descriptor and so on.

Please amend the paragraph beginning on page 16, line 7, as follows:

To guarantee connection status consistency of both ends of the established QoS connection, namely to guarantee synchronization of resources on both ends of the QoS connection, and thereby ~~[[to]]~~ implement reliable transfer of QoS resource control messages, the ~~[[said]]~~ disclosed method ~~of the present invention~~ further ~~[[comprises]]~~ includes a processing procedure of checking the status of the QoS connection established between local bearer network resource manager and peer bearer network resource manager ~~[[, wherein the]]~~ . The specific procedure of checking the QoS connection status is shown in ~~[[figure]]~~ Figure 7, ~~[[comprising]]~~ and includes the following steps:

Please amend the paragraph beginning on page 16, line 33, as follows:

Step 73: after receiving the connection status inquiry request, the ~~[[said]]~~ connection node will send a connection status inquiry response to peer bearer network resource manager, ~~[[namely]]~~ such that the connection node will return QoS connection resource status of the connection node to peer bearer network resource manager.

Please amend the paragraph beginning on page 17, line 16, as follows:

The ~~[[said]]~~ connection status inquiry report carries information including:

Please amend the paragraph beginning on page 17, line 26, as follows:

In accordance with the ~~present invention~~ disclosed method, when the messages need to be transferred from local bearer network resource manager to peer bearer network resource manager through multiple intermediate bearer network resource managers, the [[said]] intermediate bearer network resource managers only play the message transfer role, without needing to send corresponding messages to the connection nodes under its control and management just as local bearer network resource manager and peer bearer network resource manager do.